

You must show ALL work.

Solve each equation for the indicated variable.

$$1. \frac{9-(-1)}{5x} = \frac{5}{x+6}$$

$$\frac{10}{5x} = \frac{5}{x+6}$$

$$10(x+6) = 5(5x)$$

$$10x + 60 = 25x$$

$$-10x \quad -10x$$

$$\frac{60}{15} = \frac{15x}{15}$$

$$4 = x$$

$$4. (6x) \frac{x-9}{6} = 2(6)$$

$$x-9 = 12$$

$$+9 \quad +9$$

$$x = 21$$

$$2. \frac{3}{2} \cdot \frac{2}{3} x = -8 \cdot \frac{3}{2}$$

$$x = -12$$

$$3. 4x + 3 = 19$$

$$\frac{-3 \quad -3}{4x = 16}$$

$$\frac{4}{4} \quad \frac{4}{4}$$

$$x = 4$$

$$5. \frac{1}{2}x - \frac{2}{3} = \frac{1}{6}$$

$$+\frac{2}{3} \quad +\frac{2}{3}$$

$$\frac{2}{1} \cdot \frac{1}{2} x = \frac{5}{6} \cdot \frac{2}{1}$$

$$x = \frac{5}{3}$$

$$6. 9x - 4(x+1) = 31$$

$$9x - 4x - 4 = 31$$

$$5x - 4 = 31$$

$$+4 \quad +4$$

$$\frac{5x}{5} = \frac{35}{5}$$

$$x = 7$$

$$7. 3x - (8 + 3x) = 8$$

$$3x - 8 - 3x = 8$$

$$-8 = 8$$

no solution

$$8. 6(2x-3) = 5(2-x) - 13$$

$$12x - 18 = 10 - 5x - 13$$

$$12x - 18 = -5x - 3$$

$$+5x \quad +5x$$

$$17x - 18 = -3$$

$$+18 \quad +18$$

$$\frac{17x}{17} = \frac{15}{17}$$

$$x = \frac{15}{17}$$

$$9. 3x - (7x + 12) = 2(x - 3)$$

$$3x - 7x - 12 = 2x - 6$$

$$-4x - 12 = 2x - 6$$

$$+4x \quad +4x$$

$$-12 = 6x - 6$$

$$+6 \quad +6$$

$$-6 = 6x$$

$$\frac{-6}{6} = \frac{6x}{6}$$

$$-1 = x$$

$$10. 6(11-2x) - (5x+17) = 9(10-2x) + 23$$

$$66 - 12x - 5x - 17 = 90 - 18x + 23$$

$$-17x + 49 = -18x + 113$$

$$+18x \quad +18x$$

$$x + 49 = 113$$

$$-49 \quad -49$$

$$x = 64$$

Solve for the indicated variable.

11.  $A = \frac{1}{2}bh$  for  $h$

$$(2) A = (2) \frac{1}{2} bh$$

$$\frac{2A}{b} = \frac{bh}{b}$$

$$\boxed{\frac{2A}{b} = h}$$

13.  $ax - c = b$  for  $x$

$$\begin{array}{r} +c +c \\ \hline ax = b+c \\ \frac{ax}{a} = \frac{b+c}{a} \\ x = \frac{b+c}{a} \end{array}$$

12.  $P = 2l + 2w$  for  $w$

$$\begin{array}{r} -2l -2l \\ \hline \frac{P-2l}{2} = \frac{2w}{2} \\ \boxed{\frac{P-2l}{2} = w} \end{array}$$

14.  $\frac{3b-4}{2} = c$  for  $b$

$$\begin{array}{r} 3b-4 = 2c \\ +4 +4 \\ \hline 3b = 2c+4 \\ \frac{3b}{3} = \frac{2c+4}{3} \\ \boxed{b = \frac{2c+4}{3}} \end{array}$$

Write an equation and solve.

15. Translate the verbal sentence into an equation and then solve.

Twice a number increased by 5 is the same as the number decreased by seventeen.

Equation:  $2x + 5 = x - 17$

Write an equation and then solve.

16. Stephen is buying a pair of water skis that are on sale for  $\frac{2}{3}$  of the original price. After he uses a \$25 gift certificate, the cost before taxes is \$115. What is the original price of the skis?

What are you looking for? The original price of the skis.

Equation:  $\frac{2}{3}x - 25 = 115$

$$\begin{array}{r} \frac{2}{3}x + 25 = 115 \\ +25 -25 \\ \hline \end{array}$$

$$\begin{array}{r} 3 \cdot \frac{2}{3}x = 90 \cdot \frac{3}{2} \\ \frac{2}{3}x = 135 \\ x = 135 \end{array}$$

17. Find **three consecutive odd integers** whose sum is 117. Find the integers.

Equation: \_\_\_\_\_

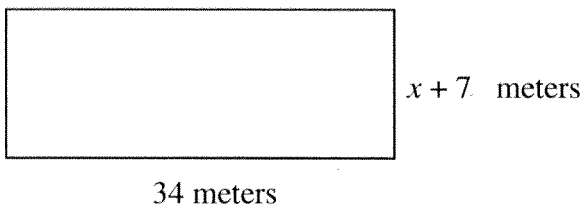
$$x + (x+2) + (x+4) = 117$$

$$\begin{array}{r} 3x + 6 = 117 \\ -6 -6 \\ \hline \end{array}$$

$$\begin{array}{r} 3x = 111 \\ \frac{3x}{3} = \frac{111}{3} \\ x = 37 \end{array}$$

$$\underline{37, 39, 41}$$

18. If the area of the rectangle pictured below is  $408 \text{ m}^2$ . Find the width of the rectangle.



Equation: \_\_\_\_\_

$$34(x+7) = 408$$

$$\begin{array}{r} 34x + 238 = 408 \\ - 238 \quad - 238 \\ \hline \end{array}$$

$$34x = 170 \quad x = 5$$

width =

$$5 + 7$$

12 meters

19. A container company wants to make a cylindrical can with a volume of 1188 cubic inches. The formula  $V = \pi r^2 h$  is used to calculate the volume of a cylinder, where  $V$  represents the volume,  $r$  represents the radius of the cylinder's base, and  $h$  represents the height of the cylinder.

- a) Solve the formula for  $h$ .

$$\frac{V}{\pi r^2} = \frac{\pi r^2 h}{\pi r^2}$$

$$\frac{V}{\pi r^2} = h$$

$$\underline{h = \frac{V}{\pi r^2}}$$

- b) What height should the company make the can if the radius of the base must be 6 inches? Use  $\pi \approx 3.14$  Round to nearest hundredth.

$$\underline{h = \frac{1188}{3.14(6^2)} \approx 10.51}$$

20. (Multiple Choice): If  $\frac{x}{6} - 2 = 4$ , the value of  $\frac{x}{4}$  is \_\_\_\_\_.

$$\frac{x}{6} - 2 = 4$$

$$\frac{x}{6} + 2 = 6$$

$$(6) \frac{x}{6} = 6(6)$$

$$x = 36$$

$$\frac{36}{4} = 9$$

a. 1

b. 9

c. 12

d. 36

21. (Multiple Choice): Complete the equation by inserting an expression that makes the equation true.

$$(x+4) - 2x - (x+3) + \underline{\hspace{2cm}} = 5x - 3$$

$$x + 4 - 2x - x - 3$$

$$-2x + 1 + \underline{7x - 4} = 5x - 3$$

a.  $7x - 10$

b.  $7x - 4$

c.  $x - 4$

d.  $-3x - 10$

THE STEPS FOR SOLVING THE EQUATION BELOW ARE SHOWN. JUSTIFY EACH OF THEM BY NAMING A PROPERTY, METHOD OR AXIOM OF EQUALITY LISTED IN THE WORD BANK.

Word Bank	
Addition Property of Equality	Subtraction Property of Equality
Multiplication Property of Equality	Division Property of Equality
Commutative Property	Associative Property
Combining Like Terms	Distributive Property
Symmetric Property of Equality	Substitution Property of Equality

$$2x + 7 = -13$$

$$2x + 7 - 7 = -13 - 7$$

$$\frac{2x}{2} = \frac{-20}{2}$$

$$x = -10$$

- A. Given
- B. Subtraction Prop of Equality
- C. Division Property of Equality
- D. Substitution

$$-8(4 + 9x) = 7(-2 - 11x)$$

$$-32 - 72x = -14 - 77x$$

$$-32 - 72x + 77x = -14 - 77x + 77x$$

$$-32 + 5x = -14$$

$$-32 + 32 + 5x = -14 + 32$$

$$5x = 18$$

$$\frac{5x}{5} = \frac{18}{5}$$

$$x = 3.6$$

- A. Given
- B. Distributive Property
- C. Addition Property of Equality
- D. Substitution
- E. Addition Property of Equality
- F. Substitution
- G. Division Property of Equality
- H. Substitution